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मानक

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Mazdoor Kisan Shakti Sangathan

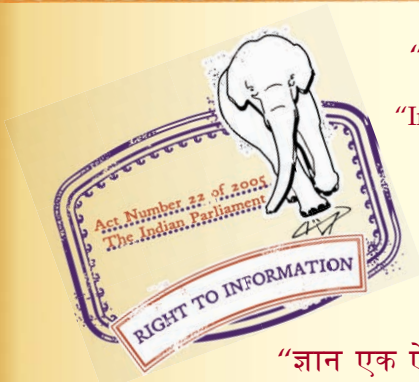
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 12456 (2004): Fire Protection of Electronic Data Processing Installation - Code of Practice [CED 36: Fire Safety]



“ज्ञान से एक नये भारत का निर्माण”

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“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक
इलैक्ट्रॉनिक डाटा संसाधन संस्थापन की
अग्नि से सुरक्षा — रीति संहिता
(पहला पुनरीक्षण)

Indian Standard

FIRE PROTECTION OF ELECTRONIC DATA
PROCESSING INSTALLATION — CODE OF PRACTICE
(*First Revision*)

ICS 13.220.20; 35.020

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Fire Safety Sectional Committee had been approved by the Civil Engineering Division Council.

Electronic data processing (EDP) equipment is a machine or a group of machines that uses electronic circuitry to perform arithmetic or logical operations automatically by means of an internally or externally stored programme of machine. The development and the use of EDP system is a direct result of the technological breakthrough. With increased complexity of modern industry, business and research work, it has become a vital tool in recent years and obviously warrants proper protection. As the equipment is used for processing large amount of statistical, problematical and experimental information, its malfunctioning can put the whole programming operation in jeopardy. This speaks for the importance of its safeguarding against any fire hazard since a rise in temperature of the surroundings of the system exceeding 45°C will cause its malfunctioning and a sustained ambient temperature above 50°C may cause irreversible failures.

The electronic data processing area should be deemed to include the following areas:

- a) *Central processing area* — Where the central processing unit and its associated equipment are installed.
- b) *Data handling area* — Where the data is processed through the computer media, for example, punched cards, punched paper tape, magnetic tape or disk, etc.
- c) *Media stores* — Ready use paper store and magnetic media library.
- d) *Output printing area* — Where the printing of output data is carried out.
- e) *Communication area* — Where the EDP telecommunication system is installed.

The tackling of fire with speed and effectiveness assumes great importance. The security staff and other staff should be trained in the use of fire fighting equipment.

The purpose of this standard is to set forth the minimum requirements for the protection of electronic computer/data processing equipment and associated areas from damage by not only fire but also its associated effects that is smoke, corrosion and water. This standard was first published in 1988 and with the experience gained and technological advancement in the field and in view of halon phase out, the technical committee has now revised this standard.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

FIRE PROTECTION OF ELECTRONIC DATA PROCESSING INSTALLATION — CODE OF PRACTICE (*First Revision*)

1 SCOPE

This standard lays down the minimum requirements for the protection of electronic computer/data processing equipment from damage by fire covering the structural environment and its protection.

NOTES

1 The requirements contained in this standard are applicable to installations for commercial electronic data processing (EDP) and industrial process control where substantial material damage and/or business interruption losses could occur. They are not intended to cover tabletop or desk type computers or remote terminals or micro-processors (having limited value concentration) although they may be used as a guide for the protection of this type of equipment. This document may also be useful where a small group of desk type computers are installed in a certain location.

2 Software installations situated in electronic and industrial parks may also use this standard as a guide for protection of their equipment.

2 REFERENCES

The standards given in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated at Annex A.

3 GENERAL

3.1 The application of this standard shall be based on the risk considerations as stated in 3.2. The mere presence of the electronic computer/data processing equipment does not constitute the need to invoke the requirements of this standard.

3.2 Following factors shall be considered when determining the need for protecting the environment, equipment, function, programming, records, and supplies:

- a) Fire threat of the installation to occupants or exposed property particularly for the telecommunication installations,
- b) Economic loss from loss of function or loss or records, and

- c) Economic loss from value of equipment.

3.3 Nothing in this standard is intended to prevent use of systems, methods or devices of superior quality, strength, fire resistance, etc, provided technical documentation is submitted to the authorities concerned to demonstrate the superiority.

4 TERMINOLOGY

4.1 Approved — Acceptable to the authorities concerned.

4.2 Authority Concerned — The authority concerned is the organization, office or individual responsible for “approving” equipment and/or an installation or a procedure.

4.3 Automated Information Storage System (AISS) — An enclosed storage and retrieval system that moves recorded media between storage and electronic computer systems.

4.4 Aspiring (Smoke Sampling) System — A fire detection system that monitors a protected space for the presence of smoke by drawing an air sample from the protected space, through pipework, to a central detection point. The air sample is tested for the quantity of smoke present and an alarm condition is signalled at a pre-determined response level.

4.5 Business Interruption — The effect on business operations from the time that equipment was initially lost or damaged until it has been restored to the former level of operation.

4.6 Central Processing Area — The room or enclosure in which the central processing unit and its associated equipment are installed.

4.7 Coincidence Connection — A facility incorporated into a fire detection and alarm system, whereby the detection of the products of combustion (for example smoke from a fire) by at least two separately identifiable detection sources (that is detection and confirmation of the existence of fire) generates a suitable output for triggering, for example, the release of a gaseous total flooding extinguishing system.

4.8 Communications Area — The room or enclosure in which the EDP telecommunications are installed.

4.9 Computer Area — An area of a building where the computer room is located including support rooms served by the same special air conditioning/air handling equipment as the computer room.

4.10 Computer Room — A room within the computer area that contains the electronic computer/data processing equipment.

4.11 Console — A unit containing main operative controls of the system.

4.12 Data Handling Area — The room or enclosure in which data is received and transferred to computer input media such as magnetic tape or disc, including direct heading equipment.

4.13 Easily Accessible — When the covers, panels, doors, or other enclosures for the electronic components within the equipment or the flooring can be removed or opened by quick, simple operations to expose any area that might be involved in fire and permit the application of an extinguishing medium.

4.14 EDP Installations — A fixed installation of a system of electronic data processing equipment or industrial process control.

4.15 Electronic Computer System — Any electronic digital or analog computer, along with all peripheral, support, memory, programming or other directly associated equipment, records, storage, and activities.

4.16 Electronic Data Processing Area (EDP Area) — The room or enclosure in which the machinery and electronic equipment necessary to receive or transmit data, to process it and either to record or print the output results, or to feed the output directly to controlled process are situated. The EDP area may comprise the central processing area, data handling area, media stores, output area, communications area and other areas served by the same air conditioning system. Other areas such as clean rooms and industrial processing may be determined to constitute part of the EDP area.

4.17 Electronically Interconnected — Units that must be connected by a signal channel to complete a system or perform an operation.

4.18 Fire Resistance — The period for which an element of structure satisfies the relevant requirements of the test for fire resistance specified in IS 3809.

4.19 Fire-Resistant Rated Construction — Construction in which the structural members, including walls, partitions, columns, floors, and roof construction, have fire resistance ratings of time duration not less than that specified in this standard.

4.20 Heat Detector — A device that detects abnormally high temperature or rate-of-temperature rise.

4.21 Interconnecting Cables — Signal and power cables for operation and control of system.

4.22 Labelled — Equipment or materials to which has been attached label, symbol or other identifying mark of an organization acceptable to the authority concerned and concerned with product evaluation, that maintains periodic inspection of production of labelled equipment or materials and by whose labelling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

4.23 Listed — Equipment or materials included in a list published by an organization acceptable to the "authority concerned" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE — The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labelled. The concerned authority should utilize the system employed by the listing organization to identify a listed product.

4.24 Master Record — A record of information on a medium that can be referred to whenever there is a need to rebuild a database.

4.25 Media Stores — The ready-use paper store and magnetic media library.

4.26 Non-combustible — The property of a material, which satisfies the requirements for non-combustibility when tested in accordance with IS 3808.

4.27 Operations Room — A room in which the general running of the EDP operations is managed. This room may be remote from the EDP installation.

4.28 Output Printing Area — The room or enclosure in which the printing of output data is carried out.

4.29 Program — Instructions to direct system operation.

4.30 Protected Enclosure — An enclosed volume protected by a fire detection and/or extinguishing system in which the EDP installation and other related equipment is installed.

4.31 Protected Space — The area or volume protected by a fire detection and/or extinguishing systems in which the EDP and other equipment are installed.

4.32 Raised Floor — A platform with removable panels on which equipment is installed, with the intervening space between it and the main building floor used to house the interconnecting cables and at times as a means for supplying conditioned air to the

data processing equipment and the room (Sometimes referred to as a false floor or secondary floor).

4.33 Records (Important) — Records of which a reproduction could be obtained only at considerable expense and labour only after considerable delay.

4.34 Records (Vital) — Records that are irreplaceable, such as records of which a reproduction does not have the same value as an original; records needed to sustain the business promptly or to recover monies with which to replace buildings' equipment, raw materials, finished goods, and work under progress; and records needed to avoid delay in restoration of production, sales, and service.

4.35 Separate Fire Division — A portion of a building cut off from all other portions of the building by firewalls, fire doors, and other approved means adequate to prevent any fire that may occur in one fire division from extending to another fire division.

4.36 Smoke Detector — A device that detects the visible or invisible particles of combustion.

4.37 Supervision — Continuous surveillance of a system or operation by special supervisory equipment or personnel to alert those responsible that failure has occurred or that a hazardous condition is being approached.

5 LOCATION AND CONSTRUCTION

5.1 Location

- a) EDP areas should preferably be housed in a separate building of non-combustible construction (including linings) having a fire resistance of at least 1 h, reserved solely for the purpose of carrying out all processes associated with that function.
- b) Where the EDP area is bounded partly or wholly by external walls, which may be subjected to exposure from an external fire, all window openings therein shall be protected by 6 mm thick-wired glasses in metal frames having a fire resistance of at least 60 min. No door openings shall be permitted on the exposed side unless protected by fire check doors having 60 min fire rating, conforming to IS 3614 (Part 1).
- c) The EDP area should be so located that it is not exposed to fire, water, corrosive fumes and smoke from adjoining areas directly or indirectly.

5.2 Where the EDP area forms a part of larger premises, that is, it is in communication with the adjoining occupancies in the same building, it should be separated from those occupancies by non-combustible walls/

floors having a minimum period of fire resistance as given in Table 1.

5.3 Openings in the fire rated walls between the EDP and adjoining areas shall be protected by fire check doors on either side having a combined fire rating equivalent to that of the walls. The fire check doors shall be fabricated and erected in accordance with IS 3614 (Part 1) and the same can be of either manually or automatically operated type. No window openings shall be allowed in separating walls.

Table 1 Fire Resistance for Walls and Floors
(Clause 5.2)

Sl No.	Fire Separation minutes		Nature of Adjoining Occupancies
	Walls	Floors	
(1)	(2)	(3)	(4)
i)	120	120	Houses, office premises, banks and the like
ii)	120	120	Shops, canteens, risk having low fire hazard [see National Building Code (Part IV)] and the like
iii)	240	240	Moderate and high hazard risks [see National Building Code (Part IV)], Storage warehouses and the like

5.4 Consideration should also be given to the use of smoke check doors for the separation narrated in 5.3.

5.5 The data handling area and output printing area, and other areas where large quantities of paper are handled, should preferably be separated from the central processing area by wall or partitions of non-combustible construction having at least 1 h fire resistance extending from the main floor to structural ceiling. Self-closing fire check doors of at least 1 h fire resistance should protect every opening therein. Paper and other combustible materials should be kept in totally closed metal cabinets or similar receptacles.

5.6 Walls (both external and internal), wall linings, or ceiling materials/lining and any suspended ceiling should be built from non-combustible materials.

5.7 Where raised (platform) floors are built above existing main floors, they should be of a adequate strength, non-combustible and should not incorporate materials having a melting point lower than 600°C. The design of a raised floor should be such that it retains its integrity and provides adequate thermal insulation in the event of a fire developing in the void beneath. Wherever combustible materials are used, the raised floor should be faced on the underside with non-combustible material.

5.8 The false floor material should be anti-static. Provision of facing on underside of panels with GI sheet/non-combustible material is preferable.

5.9 In order to avoid the risk of water damage from external sources in the computer area, the main floor level should be raised and sills (with or without ramps) fitted at all door openings. Particular care should be taken to avoid flooding of cable voids formed by cutting ducts in main floors. The main ceiling and the main floor of the EDP area should be made water-resistant and dust proof, by suitable means to ensure long-term protection.

5.10 Service pipes carrying water (for example, central heating), other than pipes for sprinkler protection of the EDP area shall not be brought into the EDP area unless a water supply is essential for the efficient operation of the installation. In such cases provision should be made for cutting off any water supplies other than those to sprinkler systems in an emergency. Bunding of pipes and the use of leakage detection systems should also be considered.

5.11 All ventilation or service or air conditioning ducts serving other parts of the building shall not pass through EDP area. Where this is impracticable, this may be allowed subject to the condition that the ventilation and service ducts pass through fire resistant shafts having rating according to that of walls and floors of the EDP area (*see 6.1*).

5.12 EDP areas should not be located in basements where this is absolutely impracticable; precautions should be taken to prevent flooding and there should be adequate access for fire fighting personnel.

5.13 Where large discharges or deposits of water may occur (for example from the operation of sprinklers or leakage of water services), adequate facilities should be available to enable removal of the water.

5.14 Small workshops required for the maintenance of EDP installations, supervisor's room and the like occupancies may form part of the EDP area only, if they are adequately separated from critical areas by fire resistant compartmentation of at least 1 h fire resistance.

6 UTILITIES AND SERVICES

6.1 As far as possible dedicated air conditioning plant should be considered for the EDP area and the plant room should be separated from the EDP area by walls having fire resistance of at least one hour. The access to the plant room should be from outside and not through the EDP area (*see 5.11*).

6.2 All air conditioning ducts, including insulation and lining, should be constructed of non-combustible materials. In large EDP areas, consideration should be given to air conditioning systems independent from the rest of the building and to the type of system used. All air ducts should include automatic dampers (*see 6.8*) having a rating of at least one hour.

6.3 Any filter media should also be non-combustible and regularly cleaned or replaced to remove accumulations of combustible materials.

6.4 Good fire (and fire spread) prevention measures, manually operated and suitably labelled Emergency Override switches that can shut down the air conditioning system should be provided in addition to the automatic control facilities. The switches should be located near the main exit door with controlled access. Manual controls for disconnecting the electrical power supplies to the EDP installation (but not to essential services such as emergency lighting) should be located near the main exit door and the operator's consoles.

6.5 The air conditioning duct on the delivery side of the fan should be protected by smoke detectors as part of the detection system described in 8.1.

6.6 Only indirectly heated air should be used in the air conditioning system.

6.7 Special arrangements should be made to prevent the accumulation of heat and smoke in the EDP area by the use of extract systems.

6.8 To ensure control of fire spread and tightness of space in the event of extinguishant discharge, the air conditioning system (including dampers) should be interfaced with the fire protection system (*see 8*).

6.9 Facilities should be provided for the extraction of extinguishant after a discharge.

6.10 Lighting systems should be provided in compliance with various requirements of the National Electrical Code. The illumination level shall not be less than 500 lux.

6.11 The building housing the EDP area should be equipped with an efficient lightning protection system in accordance with National Electrical Code and also IS 1646. Consideration should also be given to providing voltage transient protection on power and telecommunication lines and to electrical bonding of equipment.

6.12 All new electrical installations should also meet with the requirements in the applicable sections of the National Electrical Code.

- a) Cables should be installed in conduit or trunking, or clipped to the slab or perimeter or on a tray. Loose bundles of cables are not acceptable.
- b) Power, lighting and communication cables should be segregated.
- c) In ceiling and floor voids used as air handling plenums, PVC data cables clipped to a tray

are acceptable only if they are separated from power cables and smoke detection is provided. Mineral insulated cable may be installed unenclosed.

power cords, plugs, and connectors shall be of a listed type. They shall be considered as part of the computer system and suitable for installation on the floor or under a raised floor.

7.1.4 Cords

Approved flexible cord and plug assemblies used for connecting computer equipment to the branch circuit (to facilitate interchange) shall not exceed 4.5 m in length.

7.1.5 Filters

Air filters for use in the cooling systems of individual units shall be of a listed type. They shall be arranged in such a way that they can be readily removed, inspected, cleaned or replaced when necessary.

7.1.6 Liquids

If the design of the unit is such that oil or equivalent liquid is required for lubrication, cooling or hydraulic purposes, it shall have a closed-cup flash point of 150°C or higher, and the container shall be of a sealed construction, incorporating automatic pressure relief devices.

7.1.7 Acoustical Materials

All sound-deadening material used inside computer equipment shall be of such material or so arranged that it does not increase the potential of fire damage to the unit or the potential of fire propagation from the unit.

7.2 General Storage

7.2.1 Paper stock, inks, unused recording media, and other combustibles within the EDP area shall be restricted to the absolute minimum necessary for efficient operation. Any such materials in the EDP area shall be kept in totally enclosed metal file cases or cabinets. If it is provided for individual machine design, shall be limited to the quantity prescribed and located in the area designated by the equipment manufacturer.

7.2.2 Reserve stocks of paper, inks, unused recording media and other combustibles shall be stored in one or more rooms outside of the EDP area (*see 5.5*).

7.2.3 The space beneath the raised floor shall not be used for storage purposes.

7.2.4 Abandoned cables shall not be allowed to accumulate. Cables not identified for future use shall be removed.

8 FIRE PROTECTION, DETECTION AND EXTINCTION EQUIPMENT

8.1 Automatic Fire Detection System

- a) The EDP and all associated areas (including

It is recommended that flame retardant, non-corrosive and low smoke producing cables, as specified in IS 1554 (Part 1), be used where appropriate.

6.13 All services, cable ducts, etc, should be fire stopped to ensure the required integrity of the construction.

6.14 The number of junction boxes in under floor areas should be kept to a minimum. If they are required to be used, they should be of metal, completely enclosed, easily accessible, properly grounded and in accordance with the requirements of the SP 30. No connection should be made in the underfloor area except within junction boxes, approved type receptacles, the connector.

6.15 Cable openings or other penetrations through fire-rated walls and/or floors or other fire rated partitions/assemblies within the EDP area and also between the EDP area and the adjoining occupancies shall be fire stopped with a properly installed listed fire stopping material (passive equipment) that has a fire resistance rating of at least equivalent to the fire resistance rating of the penetrated building components as stated above.

6.16 All the passive equipments, such as fire doors, dampers, fire stops, etc, shall have a fire rating of atleast equivalent to the fire resistance rating of the building components in which they are installed.

7 MATERIALS AND EQUIPMENT WITHIN EDP AREA

7.1 General

7.1.1 Only computer equipment and support equipment shall be permitted in EDP area.

NOTES

1 Small supervisory offices and similar light hazard occupancies directly related to the electronic equipment operations may be permitted within the EDP area.

2 Records shall be permitted in the EDP area but the amount of records within the EDP area shall be kept to the absolute minimum required for its essential and efficient operation. Only records that are essential to the computer operations should be allowed to be kept in the EDP area.

7.1.2 Office furniture in the EDP area shall be of metal construction.

NOTES

1 Metal frame chairs with integral upholstery shall be permitted.

2 Insulated or controlled conductive coverings shall be permitted on surfaces of chairs, tables, desks etc.

7.1.3 Interconnecting cables and wiring between units,

floor and ceiling voids) which contain components critical to their functioning should be protected by an approved automatic fire alarm system installed in accordance with this Standard as well as IS 2189. Where requirements in both the standards differ, this Standard shall take precedence. Adjoining areas communicating with EDP area should also be protected by an approved automatic fire alarm system as stated above unless separated as stated in 5.2.

- b) All fire detectors should be sited in the most advantageous position to detect the anticipated phenomenon (theory of detection).
- c) Where problems exist that may prevent the rapid detection of a fire (such as fast air currents caused by air conditioning) the additional or alternative measures should be taken as given in Table 2. This table is mainly concerned with conventional point detection but specialized detection operating on other principles, such as aspirating system [see 8.1 (f)] may also be appropriate.
- d) The operation of the fire alarm system covering the protected space should automatically initiate emergency shutdown procedures for all electrical power supplies in the EDP area and shut down any air conditioning system serving the protected space [see 6.4 and 8.1(a)]. The only exception to the above is where an automatic shutdown of equipment controlled from a continuously manned EDP area would result in extensive business interruption. Installation should be capable of being shutdown manually in a predetermined manner on the indication of the operation of the fire alarm system.
- e) *Coincidence connection* — If it is intended that gaseous extinguishing systems are to be actuated by the operation of a fire detection system, then every care should be taken to avoid unwanted discharge. This could be caused by false alarms in the detection system. A method of minimizing the possibility of false alarm leading to unwanted discharge is by using coincidence connection of smoke detectors. The following recommendations should be adopted when using coincidence connection:
 - 1) All smoke detectors used should conform to IS 11360.
 - 2) Operation of the first detector should result in an indication of fire at the fire alarm control and indicating equipment.
 - 3) If the control and indicating equipment

can uniquely identify the status of each detector on a circuit (that is addressable system), then the detector and confirmation detector(s) may be connected on the same detection circuit. For non-addressable systems, coincidence detectors need to be installed on separate detection circuits.

- 4) Due to the principles of operation of coincidence connection (for example Loss of up to 50 percent of point detectors within a protected space, after the first detector operation) it is recommended that the density of detectors is increased to 15 m² per detector for all protected spaces, or greater as given in Table 2.
- 5) Where the fire hazard requires the use of both photo-optical and ionization chamber point smoke detectors, a minimum of two of each type should be provided in the protected space, with at least one of each type per circuit (for non-addressable systems). The two types of detector should be evenly distributed over the protected space and over any sub-division of the protected space (for example a ceiling void). At least two of each type of detector should be provided in each protected space or sub-division (cross-zoning principle).
- f) Aspirating systems may be used as additional protection to the ore conventional point smoke detection. If such systems are used, the following points should be considered:
 - 1) The system should be approved by the authorities concerned or have approval from the country where it originated.
 - 2) If the level of response to smoke is adjustable, then qualified personnel should make all adjustments. The adjustments should ensure the optimum response to smoke without unduly increasing the risk of false alarm.
 - 3) The siting and spacing for all parts of the system should be in accordance with manufacturer's instructions and where appropriate in accordance with IS 2189.
 - 4) The system should not be used to directly initiate extinguishant discharge, unless prior agreement exists between the user and the authorities concerned.
- g) An indicator panel associated with the automatic fire alarm system should be installed in a readily visible position adjacent to the EDP area. Panels used for the indication of the status of the extinguishing system should be located

outside the EDP area at all entrances. All manual controls for the extinguishing system should be readily accessible.

- h) In some circumstances, in addition to the general protection, specialized in-cabinet detection devices may be required. If such devices are used, they should, where applicable, conform to an appropriate standard and be installed by qualified personnel to the manufacturer's instructions. There should be remote indication of any concealed detectors.
- j) Where interlock and shutdown devices are provided, the electrical power thereto shall be supervised by the fire alarm panel(s).

Table 2 Siting of Detectors
[Clause 8.1(c) and (e)]

Sl No.	Description of Risk	Spacing/Siting of Detectors
(1)	(2)	(3)
i)	General EDP area	25 m ² per detector
ii)	Paper storage (Bulk and Roll)	100 m ² per detector
iii)	Ceiling and floor voids	15 m ² per detector for velocities up to 4 m/s 10 m ² per detector for velocities beyond 4 m/s
iv)	Equipment cabinets in EDP area	To be sited in agreement between the manufacturer and the user
v)	Air conditioning installation and ventilation ducts and plenums	Sited at all inlets and outlets where the dilution factor is low and within ducts, where practical Specialized duct mounting detectors should be sited in agreement between manufacturer and user

8.2 Fixed Automatic Extinguishing Systems

- a) EDP and adjacent areas (including associated floor and ceiling voids) should be protected by one of the following fixed automatic extinguishing systems:

- 1) A sprinkler installation in accordance with IS 15105 for automatic sprinkler installations.

NOTE — Sprinkler systems is unsuitable for floor void protection (see Table 3).

- 2) Clean agent total flooding system in accordance with IS 15493.

NOTE — There are restrictions on the use of Halons are identified by the Country Strategy prepared by the Halon Alternative Options Committee in consultation with Ozone-cell.

- 3) A carbon dioxide total flooding system in accordance with IS 15528.

- 4) A High expansion foam system (Recommended for use in floor voids only).

- 5) System selection depends largely on the specific hazards presented by the risk to be protected. In general, however, the applications recommended in Table 3 should be used.

- b) Procedures for ventilating the protected enclosure after discharge of the extinguishing agent should be established. Where foam is used, special facilities may be required for its removal, after discharge (see 6.9).
- c) In order to minimize the period during which protection is not provided following discharge, procedures for the replacement of extinguishing agent supplies should be established. Where appropriate, the provision of standby supplies should be considered, especially for critical installations where minimal disruption is required.

The operation of the gaseous total flooding systems, should comply with the health and safety requirements contained in the respective Indian Standards. The requirements for operation of each type of system are set out below. Persons must not be present in the protected space during the discharge of:

- 1) Any carbon dioxide total flooding systems.
- 2) Clean agent total flooding systems where the designed concentration exceeds the limits by volume at the maximum anticipated temperature set in the respective Indian Standards.

- d) *Carbon dioxide* — When the protected enclosure is normally unoccupied, operation of the automatic fire detection system should automatically actuate the extinguishing system. When it is occupied, carbon dioxide total flooding systems should be in the manual only operating mode with the controls located outside the computer area or near the main exit door. Entry to the computer area should be possible only when the system is under manual control.
- e) *Clean agents* — When the protected enclosure is unoccupied, operation of the automatic fire detection system should automatically actuate the extinguishing system.
- f) The following precautions, are relevant to automatically operated clean agent total flooding systems in areas which may be occupied:

Table 3 Selection of Extinguishing Method

[Clause 8.2 (a)]

Sl No.	Risk Type	Extinguishing System				Sprinkler	High Expansion Foam
		Clean Agent		CO ₂			
		Total flood	Local	Total flood	Local		
		(3)	(4)	(5)	(6)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Computer rooms, EDP installations and associated electronic equipment	✓		✓ ^{b)}		✓	
ii)	Equipment, cabinets in above areas which do not have clean agent total flooding system		✓		✓		
iii)	Bulk paper storage and/or handling areas or other risks presenting deep-seated carbonaceous fire hazards			✓		✓	
iv)	Plant areas housing equipment such as generators, air handling units, etc.	✓		✓		✓	
v)	Floor voids where separate flooding is required	✓		✓			✓
vi)	Ceiling voids	✓		✓			
vii)	Godown and Warehouse					✓	✓

^{b)} Manually operated systems only.

¹⁾ Manually operated systems only.

- 1) To allow the protected areas to be evacuated prior to extinguishing agent discharge, a time delay may be incorporated in the automatic system. The delay period will depend upon potential speed of fire spread and the means of escape from the protected area, but it should not normally exceed 30 s.
- 2) Where a time delay facility is provided the system may also be equipped with a single action biased switch (hold switch) located within the protected space which can stop the countdown to discharge from continuing whilst being held. Upon release of the switch, and provided the system remains in 'alarm', the timer should restart from the beginning.
- 3) An audible warning that the hold switch is being operated should be provided, which may be the same as the time delay signal. The design and location of the hold switch and circuit should be such that the possibility of accidental operation by falling objects or Stacking of equipment against it is prevented..

8.3 Portable Fire Extinguishing Appliances

- a) Fire extinguisher of carbon dioxide type in

accordance with IS 2878 shall be available near EDP and similar equipment. Staff should be trained to ensure that ready and safe injection of extinguishant into the CPU and associated equipment is achieved.

- b) In addition to the portable fire fighting appliances referred to in 8.3(a), suitable portable gas pressure type water fire extinguishers should be provided in accordance with IS 940 in the EDP area and near any equipment handling large quantities of paper. There should be adequate access to hose reels at any part of the EDP area.

9 COMMISSIONING OF FIRE PROTECTION SYSTEMS

9.1 In order to confirm that fire protection systems are fully functioning and adequate for their purpose. commissioning tests should always be undertaken as part of the standard acceptance procedures.

9.2 All fire detection systems should be checked for correct operation, such as simulating a fire condition as described in 9.3. All functions and indicators should be checked including the operation of coincidence connection of smoke detectors (where included). Where detection systems are used to initiate extinguishant discharge, the systems should be checked

for operation from detector through to all actuating mechanisms. Simulators may be used where one-shot devices are incorporated as actuators.

9.3 Due to the prevailing air movement conditions that may exist in the protected area, placing a smoke source close to a detector is not considered to be a realistic simulation of a fire condition. It is therefore recommended that a series of fire/smoke tests are carried out within the protected area as stated in items (a), (b) and (c). The appropriate series depends on the sensitivity required of the fire detection system and the materials existing in the protected area. The detection system should respond within 2 min from the start of each test, with the air conditioning system both on and off.

- a) *Series 1* — High sensitivity (for example, for monitoring cable and electronic components in equipment for overheating).
- b) *Series 2* — Standard sensitivity (for example to provide room space protection).
- c) *Series 3* — Special risks.

In addition to the tests above, where special hazards may exist, for example, in process control room fire test using samples of resident hazardous materials should be undertaken.

9.4 Where the fire detection system is designed to actuate a total flooding extinguishing system, it is recommended that the commissioning test is in the form of:

- a) Checking the electrical operation of the systems (*see 9.2*).
- b) Where required, testing the integrity of the enclosure. One method of testing the enclosure is by using 'door fan' apparatus.
- c) Ensuring that the fire extinguishing equipment is satisfactorily connected and fit for the purpose. This may be checked by passing pressurized air through the pipework and nozzles. (It should be noted that pressurized air does not simulate the characteristics of CO₂ or clean agents.)

9.5 Details of commissioning/acceptance testing of specific extinguishing systems are contained in the respective clean agent standard.

9.6 A full site clean agent discharge test should not be carried out unless it can be shown that no other commissioning method can be used. If a discharge test is to be used then it should be undertaken in accordance with the respective Indian Standard for each clean agent.

10 MAINTENANCE OF FIRE PROTECTION SYSTEMS

10.1 In order for the reliable and continued operation of the fire protection systems, a maintenance plan should be drawn up which should include details of routine tests.

10.2 The fire detection system should be maintained in accordance with IS 2189 and any additional maintenance required peculiar to the equipment as defined by the manufacturer.

10.3 Carbon dioxide and clean agent total flooding fire extinguishing systems should be maintained in accordance with the requirements stipulated in the respective Indian Standards for these agents.

10.4 Automatic sprinkler installations should be maintained in accordance with the requirements specified in IS 15105.

10.5 Portable fire extinguishers should be maintained in accordance with IS 2190.

10.6 Alterations to the EDP area or equipment layout are very likely to affect the performance of the protection system. Particular attention should be made with regard to fire stopping and room integrity.

11 PROTECTION OF RECORDS

11.1 The amount of record media (paper, magnetic tapes, memory drums, etc) within the computer area should be kept to a minimum.

11.2 All record media on which data is recorded and which are essential to the completion of an operation should, while not in use, be stored outside the computer area in a fire resisting room or fire resisting storage cabinet. Such rooms or storage cabinets should be specifically designed (according to the record media to be stored) to give protection against the effects of heat and moisture in the event of fire. Records of primary importance should be designed as vital records and may require additional protection measures, such as sub-division and storage in a number of smaller, protected, fire resisting cabinets; located separately.

11.3 Rooms used for the storage of records should be equipped with suitable fire protection system(s) and portable extinguishers.

11.4 Where it is necessary to keep records referred to in 11.2 in the EDP area for short periods they should be stored in a cabinet as described in 11.2.

11.5 Duplicates of records such as program tapes, disc packs, etc, which may be used unchanged from time to time should be made unless, for example, the data can be reconstructed at reasonable cost. These should not be stored in the same location as those referred to

in 11.2, but in another building adequately separated from that housing the computer area. This is especially important for vital records. It is also advisable that all operating manuals are duplicated.

11.6 Records should be protected against electrostatic discharge and electromagnetic field influences.

11.7 Multiple generations of records should be kept (if other records of equal value are not available) and should be stored as described in 11.5, if possible different generations being stored separately.

12 HOUSEKEEPING PROCEDURES AND GENERAL CONSIDERATIONS

12.1 Any flammable materials (for example flammable cleaning fluids) used for computer maintenance, should be stored outside the EDP area.

12.2 Smoking, eating and drinking should be prohibited within the EDP Area.

12.3 Waste paper should not be allowed to accumulate in the computer area. Metal bins with self-closing lids should be provided and emptied as necessary.

12.4 Voids should be maintained clean and free from litter, by adopting a regular cleaning policy.

12.5 When the computer is in use, it should be manned by personnel trained in the operation of the fire protection equipment at all times. Cleaners or other personnel having access to the EDP areas should be supervised.

12.6 An effective cable management plan should be maintained to avoid unnecessary or badly installed cables, especially under floor voids.

12.7 The electrical wiring and equipment, associated with the computer should be regularly inspected, tested and maintained as required by the *IEE Wiring Regulations* and manufacturer's instructions.

12.8 Consideration should be given to the selection of furniture with minimum content of combustible materials.

12.9 Floor tile removers should be readily available and located with the portable fire extinguishing appliances.

12.10 Action to be taken in the event of and following a fire, or the operation of an automatic extinguishing system, should be prominently displayed. Measures

or means should be available to ascertain when an area is safe to enter following a discharge. All personnel, including visiting workers, should be familiarized with the procedures.

13 CONTINGENCY MEASURES

13.1 A list of contingency measures and plans of action should be drawn up to cater for the following:

- a) Loss of equipment or records due to fire or other hazard,
- b) Loss of equipment or records due to faults or major failures, and
- c) Re-sitting or alteration of equipment or records.

The plan should include detailed procedures that would enable full recovery from back-up tapes/media. The plan procedures together with the back-ups should be controlled and guarded as vital records. No plan is effective unless it is tested. There are three levels of testing to check procedures, vital records and vital business processes:

- a) Paper exercise,
- b) Recovery exercise, and
- c) Recovery and production run and service restoration from recorded system.

The frequency of testing should depend on the criticality of the risk.

13.2 The measures should ensure that where losses occur, experts in the salvage and reclamation of data processing equipments are available as soon as possible.

13.3 In order to minimize interruption of computer time, consideration should be given to obtaining under contract either an immediate computer back-up service operation by a specialist computer company or delivery of portable computer recovery centres to the site. The disaster plan should describe the procedure to obtain a cold restart in the shortest possible time.

In some cases, duplicate (back-to-back) computer systems may be justified to minimize disruption still further. Alternatively, companies operating in proximity to one another having the same computer facilities or divisions of the same company, may adopt a mutual aid arrangement.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
940 : 2003	Specification for portable fire extinguisher, water type (gas cartridge) (<i>first revision</i>)	3614	Specification for fire check doors:
1554	PVC insulated (heavy duty) electric cables : Part 1 For working voltage up to and including 1 100 V	(Part 1) : 1966	Part 1 Plate metal covered and rolling type
(Part 1) : 1988		3808 : 1979	Method of test for non-combustibility of building materials
1646 : 1997	Code of practice for fire safety of buildings (general) — Electrical installations	3809 : 1979	Fire resistance test for structures
2175 : 1988	Specification for heat sensitive fire detectors for use in automatic fire alarm system	11360 : 1985	Specification for smoke detectors for use in automatic electrical fire alarm system
2189 : 1999	Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers	15105 : 2002	Design and installation of fixed automatic sprinkler fire extinguishing system
2190 : 1992	Code of practice for selection, installation and maintenance of portable first-aid fire extinguishers (<i>third revision</i>)	SP 30 : 1985	National Electrical Code
2878 : 1986	Specification for fire extinguisher, carbon dioxide type (portable and trolley mounted)	IS 15493 : 2004	Gaseous fire extinguishing systems — General requirements
		IS 15528 : 2004	Gaseous fire extinguishing systems — Carbon dioxide, total flooding and local application including incabinet subfloors systems

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Amendments Issued Since Publication

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